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Development Document for Final Effluent Limitations Guidelines and Standards for the Western Alkaline Coal Mining Subcategory

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DEVELOPMENT DOCUMENT FOR FINAL EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE WESTERN ALKALINE COAL MINING SUBCATEGORY

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Office of Water
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Acronyms

acre-ft: acre-feet

ASCM: Alternative Sediment Control Measure

BAT: Best Available Technology

BMP: Best Management Practice

BPT: Best Practicable Control Technology Currently Available

BTCA: Best Technology Currently Available

Btu: British thermal unit

cfs: cubic feet per second

CHIA: Cumulative Hydrologic Impact Assessment

CWA: Federal Water Pollution Control Act of 1972; the Clean Water Act

DEQ: Department of Environmental Quality

EASI: Erosion and Sediment Impacts Model

EPA: U.S. Environmental Protection Agency

FEIS: Final Environmental Impact Statement

LQD: Land Quality Division

mg/L: milligrams per liter

ml/L: milliliters per liter

MMD: New Mexico Mining and Minerals Division

MUSLE: Modified Universal Soil Loss Equation

NMA: National Mining Association

NOV: Notice of Violation

NPDES: National Pollution Discharge Elimination System

NRCS: Natural Resource Conservation Service

NSPS: New Source Performance Standard

OSMRE: Office of Surface Mining and Reclamation Enforcement

PHC: Probable Hydrologic Consequence

RUSLE: Revised Universal Soil Loss Equation

SCS: Soil Conservation Service

SEDCAD: Sediment, Erosion, Discharge by Computer Aided Design

SEDIMOT II: Sedimentology by Distributed Model Treatment

SMCRA: Surface Mining Control and Reclamation Act

SS: Settleable Solids

TSS: Total Suspended Solids

DOT: Department of Transportation

USDA: United States Department of Agriculture

USLE: Universal Soil Loss Equation

WIEB: Western Interstate Energy Board

Glossary

Alkaline Mine Drainage: Mine drainage which, before any treatment, has a pH equal to or greater than 6.0 and a total iron concentration of less than 10 mg/L.

Approximate Original Contour: Surface configuration achieved by backfilling and grading of mined areas so that the reclaimed land surface closely resembles the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain.

Arid and semiarid area: An area of the interior western United States, west of the 100th meridian west longitude, experiencing water deficits, where water use by native vegetation equals or exceeds that supplied by precipitation. All coalfields located in North Dakota west of the 100th meridian west longitude, all coal fields in Montana, Wyoming, Utah, Colorado, New Mexico, Idaho, Nevada, and Arizona, The Eagle Pass field in Texas, and the Stone Canyon and the Ione fields in California are in arid and semiarid areas (30 CFR Ch. VII § 701.5).

Armoring: Lining drainage channels with rock to limit re-transport of the channel bottom.

Arroyo: A term applied in the arid and semiarid regions of southwest United States to the small deep flat-floored channel or gully of an ephemeral stream or an intermittent stream, usually with vertical or steeply cut banks of unconsolidated material at least 60 cm high. It is usually dry, but may be transformed into a temporary water-course or short lived torrent after heavy rainfall (Bates and Jackson, 1980).

Bank Carving: A form of erosion in which the foundation of the banks of a stream or river are undermined due to an increase in flow rate causing the bank to fail.

Bank Slumping: See bank carving.

Berming: An engineering technique which creates a long mound of earth to control the flow of water.

Best Management Practice: Schedules of activities, prohibitions or practices, maintenance procedures, and other management or operational practices to prevent or reduce the pollution of waters of the United States.

British Thermal Unit: The amount of heat needed to raise the temperature of 1 pound of water by 1 degree Fahrenheit, approximately equal to 252 calories. The Btu is a convenient measure by which to compare the energy content of various fuels.

Channel Head: The upper reaches of a stream where the kinetic energy of water is highest.

Channel Head-Cutting: Loss of sediment from the upper reaches of a stream.

Channel Bed: The sediment at the deepest portion of a stream.

Coal Surface Mine: A coal-producing mine that extracts coal that is usually within a few hundred feet of the surface. Earth and rock above the coal (overburden) is removed to expose the coal seam which is then excavated with draglines, bulldozers, front-end loaders, augering and/or other heavy equipment. It may also be known as an area, contour, open-pit, strip, or auger mine.

Concentration of Contaminant: The amount of pollutant parameter proportional to the total volume.

Contour Furrowing: A soil-loss prevention technique adapted to control sediment runoff. The sediment is plowed along the contour lines which helps impede water flow.

Disturbed Area: An area which has been altered in generally an unacceptable manner by human or natural actions.

Diverting Runoff: An engineering technique to force water away from natural watercourses, allowing for reduction in water velocity and volume.

Dry wash: A wash (stream or gully) that carries water only at infrequent intervals and for brief periods, as after a heavy rainfall.

Ephemeral Stream: A stream which flows only in direct response to precipitation in the immediate watershed or in response to snow melt, and which has a channel bottom that is always above the prevailing water table.

Erosion: A natural process by the action of water, wind, and ice in which soil and rock material is loosened and removed. The major factors affecting soil erosion are soil characteristics, climate, rainfall intensity and duration, vegetation or other surface cover, and topography.

Evapotranspiration: That portion of precipitation returned to the air through direct evaporation or by transpiration of vegetation.

Ferruginous: Of coals, minerals and rocks containing iron. Water running off such materials is usually rust colored, and will tend to be acidic.

Flash Flooding: A large surge of water runoff from a storm event. Flash floods are worsened by lack of vegetation or natural flow-retarding elements such as soils, lakes or impoundments.

Flow Naturally: The course of water unimpeded or altered by man-made activity or structures.

Fluvial: Relating to, or occurring in a river.

Fluvial Processes: The physical actions of water on sediments, changing and being changed by the results of those actions.

Fluvial Morphology: Landforms and structures created by the activity of water both in motion and at rest.

Forb: A broad-leaved herbaceous plant, as distinguished from grasses, shrubs and trees.

Geotextiles: Porous fabrics composed of woven synthetic materials. Geotextiles also are known as filter fabrics, road rugs, synthetic fabrics, constructions, or geosynthetic fabrics.

Grading: Cutting and/or filling land surfaces with heavy equipment to create a desired configuration, slope or elevation.

Grass Filter Strips: Sections of land with planted grass to help retain eroding sediment.

Harvested Precipitation: The rainfall that is channeled by gutters or ditches to a storage area or for an immediate specific use.

Head-cut Erosion: The sudden change in elevation or knickpoint at the leading edge of a gully. Head-cuts can range from less than an inch to several feet in height, depending on several factors. The formation and movement of a gully head-cut are often the dominant form of damage observed in an earth spillway.

High-Yield Storm: A rain storm with a large amount of impact.

Hydrophytic Vegetation: Water-loving vegetation requiring considerable water to survive.

Hydrologic Balance: The relationship between the quality and quantity of water inflow to, outflow from, and storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake or reservoir. A water budget that encompasses the dynamic relationships among precipitation, surface runoff, evaporation, and changes in surface water and ground water storage.

Infiltration: Surface water sinking into the sediment column as the first step towards becoming ground water.

Irrigation: Application of water to agricultural or recreational land for promoting plant growth.

Kinetic Energy: Energy contained by mass in motion. In particular, rapidly moving water will

have relatively high kinetic energy, allowing for the movement of large amounts of sediment (see turbulent flow).

Mass wasting: The movement of regolith downslope by gravity without the aid of a transporting medium. Mass wasting depends on the interaction of soils, rock particles and moisture content.

Morphology: The form and structure of the landscape, i.e., slope, errosional features, hills, etc.

Mulch: A temporary soil stabilization or erosion control practice where materials such as grass, hay, woodchips, wood fibers, or straw are placed on the soil surface. A natural or artificial layer of plant residue or other materials covering the land surface that conserves moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations.

Non-consumptive retention: The impoundment of water without its extraction for other uses.

Non-process Area: The surface area of a coal mine that has been returned to required contour and on which revegetation (specifically seeding or planting) work has commenced.

Perennial Rivers: Rivers which flow during particular seasons in a predictable manner.

Periodic Releases: An infrequent discharge of water either by design or by naturally intermittent precipitation.

Precipitation: The discharge of water, in liquid or solid state, from the atmosphere, generally onto a land or water surface. The term "precipitation" is also commonly used to designate the quantity of water that is precipitated. Forms of precipitation include drizzle, rainfall, glaze, sleet, snow, and hail.

Receiving Stream: A down-gradient stream that catches runoff from a mining area.

Reclaimed Area: A disturbed area that is restored by remediation activities to an acceptable condition.

Regolith: The layer or loose unconsolidated rock material, including soil, resting on bedrock, constituting the surface of most land.

Rill Erosion: Rill erosion is the removal of soil by concentrated water running through little streamlets, or head-cuts.

Riparian Habitat: Areas adjacent to rivers and streams that have a high density, diversity, and productivity of plant and animal species relative to nearby uplands.

Runoff: That part of precipitation, snow melt, or irrigation water that runs off the land into

streams or other surface waterbody.

Runoff Event: In arid and semiarid areas, the majority of the annual precipitation occurs during infrequent rainfalls causing surface water runoff events that result in most of the erosion.

Scouring: The clearing and digging action of flowing water, especially the downward erosion caused by stream water in sweeping away mud and silt from the stream bed and outside bank of a curved channel.

Sediment: Soil and rock particles washed from land into waterbodies, usually after significant rain. For the purpose of this document, sediment is all material transported by surface water drainage, including total settleable solids, suspended solids, and bedload.

Sediment Control Measures: Engineering and biological techniques and practices to control the quantity and location of sedimentation.

Sediment Imbalance: An abnormally high increase or decrease in sedimentation rates caused by some activity.

Sediment Yield: the sum of the soil losses minus deposition in macro-topographic depressions, at the toe of the hillslope, along field boundaries, or in terraces and channels sculpted into the hillslope.

Sedimentation: The process of depositing soil particles, clays, sand, or other sediments transported by flowing water.

Sedimentation Pond: A sediment control structure designed, constructed, and maintained to slow down or impound precipitation runoff that allows the water to drop its sediment load and reduce sediment concentrations at the point source discharge.

Seep: A point where water oozes or flows from the earth.

Semiarid: Landscape characterized by scanty rainfall. Pertaining to a subdivision of climate in which the associated ecological conditions are distinguished by short grass and scrubby vegetation.

Sheet Erosion: The detachment of land surface material by raindrop impact and thawing of frozen grounds and its subsequent removal by overland flow.

Sodic: Pertaining to or containing sodium: sodic soil.

Soil Erodibility Factor: The inability of a soil to resist erosive energy of rains A measure of the erosion potential for a specific soil type based on inherent physical properties such as particle size, organic matter, aggregate stability, and permeability.

Soil Loss: that material actually removed from the particular hillslope or hillslope segment. The soil loss may be less than erosion due to on-site deposition in microtopographic depressions on the hillslope.

Steepness Factor: Combination factor of for slope length and gradient.

Terrace Levels: Sediment platforms within stream channels, where different volumes of water periodically flow.

Turbulent Flow: Chaotic water movement with high kinetic energy which allows for fast sediment erosion and sediment high carrying capacity.

Underfit: A small water flow eroding a sub-channel within a large currently dry stream channel.

Vegetation Encroachment: Abnormal vegetative growth which impedes the natural flow of a water course.

Volume of Flow: A measure of the quantitu of water moving per unit of time.

Water-monitoring Program: A sampling of water at designated locations and times to characterize how its qualitites and quantities change over space and time.

Watershed: An area contained within a drainage divide above a specified point on a stream.

Executive Summary

Purpose

This document supports the United States Environmental Protection Agency's (EPA's) promulgation of a new Western Alkaline Coal Mining Subcategory under existing regulations at 40 CFR part 434 for the Coal Mining industry. The document was developed primarily using information supplied by a Western Coal Mining Work Group consisting of representatives from federal and state regulatory agencies and industry. The purpose of this document is to provide a summary of the information collected and used by EPA to support promulgation of this subcategory and to develop the requirements under the final rule.

Western Alkaline Coal Mining Subcategory

The Western Alkaline Coal Mining Subcategory addresses sedimentation and erosion control issues that are characteristic to the arid and semiarid coal producing regions of the western United States. EPA finds that the use of additional or alternative sediment control best management practices (BMP) in non-process areas within these regions can be less harmful to the environment than the impacts resulting the use of sedimentation ponds only to comply with numeric limits. EPA believes that controlling sediment generation at the source with the implementation of BMPs will reduce erosion and sedimentation. EPA also believes that the implementation of appropriate BMPs in these regions can prevent the formation of unnatural geomorphic land and stream forms, and will improve water management, vegetation, and land uses.

This rulemaking effort adds a Western Alkaline Coal Mining subcategory to 40 CFR part 434 for coal mining operations conducted in arid and semiarid regions in the western United States. The Western Alkaline Coal Mining Subcategory is applicable to alkaline mine drainage from non-process areas, brushing and grubbing areas, topsoil stockpiling areas, and regraded areas at western coal mining operations. "Western coal mining operation" is defined as a surface or underground coal mining operation located in the interior western United States, west of the 100th meridian west longitude, in an arid or semiarid environment with an average annual precipitation of 26.0 inches or less. "Alkaline mine drainage is defined in the existing regulations as "mine drainage which, before any treatment, has a pH equal to or greater than 6.0 and total iron concentration of less than 10 mg/L." The regulation applies to the following areas:

- "Non-process area" is the surface area of a coal mine which has been returned to required contour and on which revegetation (specifically, seeding or planting) work has commenced.
- "Brushing and grubbing area" is the area where woody plant materials that would interfere with soil salvage operations have been removed or incorporated into the soil resource that is being salvaged.
- "Topsoil stockpiling area" is the area outside the mined-out area where soil is temporarily stored for use in reclamation, including containment berms.
- "Regraded area" is the surface area of a coal mine which has been returned to required contour.

Presumptive Rulemaking

The Western Alkaline Coal Mining Subcategory was developed using a presumptive rulemaking effort, implementing recommendations of EPA's Effluent Guidelines Task Force for streamlining the regulations development process and expediting promulgation of effluent limitations guidelines (May 28, 1998, 63 FR 29203). Under these recommendations, this rulemaking effort relies on stakeholder support for various stages of information gathering; utilizes existing information; focuses on an industry segment for which controls have been identified that would result in environmental improvements; and is based on early presumptions

regarding effective control technologies and key pollutant parameters. Development of this subcategory relies on existing technical and economic information compiled from demonstrated successful state approaches, federal regulatory requirements, and regulated community partnerships.